Payment will be made under:

Pay Item	Pay Unit
Stabilizer Aggregate	Ton

SECTION 520
AGGREGATE BASE COURSE

520-1 DESCRIPTION

Perform the work covered by this section including, but not limited to, constructing a base composed of an approved aggregate material hauled to the road, placed on the road, mixed, compacted and shaped in accordance with the lines, grades, depths and typical sections shown in the plans; applying a sand seal in accordance with Article 520-5; and maintaining the base.

520-2 MATERIALS

Refer to Division 10.

Item	Section
Aggregate Base Course	1006 and 1010

520-3 METHODS OF PRODUCTION

Furnish aggregate upon which no restrictions are placed on the production or stockpiling, except as provided in Sections 1005, 1006 and 1010. Place aggregates on the roadway which have been sampled, tested and approved in accordance with Article 520-6.

520-4 SUBGRADE PREPARATION

Prepare the subgrade in accordance with Section 500 before placement of the base material.

520-5 HAULING AND PLACING AGGREGATE BASE MATERIAL

Place the aggregate material on the subgrade with a mechanical spreader capable of placing the material to a uniform loose depth and without segregation; except, for areas inaccessible to a mechanical spreader, the aggregate material may be placed by other methods approved by the Engineer.

Where the Contractor elects to use more than one source of aggregate as described in Section 1005, place the various types of aggregate used in an approved manner which will permit the sampling and testing required by Section 1006 and 1010.

Where the required compacted thickness of base is 10" or less, the base material may be spread and compacted in one layer. Where the required compacted thickness is more than 10" spread the base material and compact in 2 or more approximately equal layers. Compact the base material to a minimum thickness of approximately 4" for any one layer.

Have each layer of material sampled, tested, compacted and approved before placing succeeding layers of base material or pavement.

Do not place base material on frozen subgrade or base.

Base course that is in place on November 15 shall immediately be covered with a subsequent layer of pavement structure or with a sand seal. Base course that has been placed between November 16 and March 15 inclusive shall be covered within 7 calendar days with a subsequent layer of pavement structure or with a sand seal. Apply sand seal in accordance with Section 660, except Articles 660-3 and 660-11 will not apply.

Failure by the Contractor to cover the base course as required above will result in the Engineer notifying the Contractor in writing to cover the base course with a sand seal and to suspend the operations of placing aggregate base course until such cover has been placed. If the Contractor fails to apply the sand seal within 72 hours after receipt of such notice, the Engineer may proceed to have such work performed with other forces and equipment.

The application of the sand seal by the Contractor or by others will in no way relieve the Contractor of the responsibility to maintain or repair the damaged base or subgrade, no matter what the cause of damage.

Do not allow traffic on the completed base course other than necessary local traffic and that developing from the operation of essential construction equipment as may be authorized by the Engineer. Repair any defects that develop in the completed base or any damage caused by local or construction traffic acceptably. Hauling equipment may be operated with the approval of the Engineer, over a lower layer of base, however, acceptably repair any rutting, weaving or soft areas that develop.

Do not exceed 35 mph with hauling equipment traveling over any part of the base.

Use methods of handling, hauling and placing which will minimize segregation and contamination. If segregation occurs, the Engineer may require that changes to the Contractor's methods and may require mixing on the road to correct segregation. Remove and replace all aggregate which is contaminated with foreign materials to the extent that the base course will not adequately serve its intended use. The above requirements will be applicable regardless of the type of aggregate placed and regardless of prior acceptance.

520-6 SAMPLING, TESTING AND ACCEPTANCE

Perform sampling for the determination of gradation, LL and PI for the various types of aggregate, as defined in Articles 1010-1 and 1010-2.

Where visual observation indicates the need to do so, the Engineer may require the Contractor to road mix areas of nonuniform gradation. The Engineer reserves the right to take samples in addition to the lot acceptance samples from within the lot in areas exhibiting nonuniform gradation. When the test results from such an additional sample is outside the gradation limits in Section 1010 and the nonuniformity cannot be corrected by road mixing, the aggregate base course represented by the sample will be rejected and replaced by the Contractor.

520-7 SHAPING AND COMPACTION

Machine and compact the layer of base within 48 hours after beginning the placing of a layer of the base. Maintain each layer to the required cross section during compaction and compact each layer to the required density before placing the next layer.

When electing to use conventional density test number 3 (ring test) to determine density, compact each layer of the base to a density equal to at least 100% of that obtained by compacting a sample of the material in accordance with AASHTO T 180 as modified by the Department. Copies of these modified testing procedures are available upon request from the Materials and Tests Unit.

Follow the requirements as specified in Article 520-9 when electing to use nuclear methods to determine the density.

Compact the base material at a moisture content which is approximately that required to produce a maximum density indicated by the above test method. Dry or add moisture to the material when required to provide a uniformly compacted and acceptable base.

Shape the final layer of base material in accordance with the lines, grades and typical section as shown on the plans. Construct the base course so that it is smooth, hard, dense, unyielding and well bonded upon completion. A broom drag may be used in connection with the final finishing and conditioning of the surface of the base course.

520-8 TOLERANCES

After final shaping and compacting of the base, the Engineer will check the surface of the base for conformance to the grade and typical section and determine the base thickness.

Construct the base so that the thickness of the base is within a tolerance of ± 1/2" of the base thickness required by the plans. When the base course will be used under concrete pavement, the tolerance will be ± 1/4".

Construct the base so that the maximum differential between the established grade and the base within any 100 ft section is 1/2" or 1/4" when used as a base course under concrete pavement.

520-9 DENSITY DETERMINATION BY NUCLEAR METHODS

(A) Application

The Engineer may use nuclear means as described below to determine the density of selected base course materials required by Sections 520 and 540. The target density will be from the material's most recent AASHTO T 180 test results, which may be obtained from the Materials and Tests Unit.

A new target density is to be obtained when there is a change in the source of material, when a significant change occurs in the composition of the materials from the same source or when determined necessary.

Testing will be performed in the direct transmission mode on all aggregate base course. Additional information on testing is provided in the *NCDOT Nuclear Gauge Operator's Manual*, copies of which are available from the Materials and Tests Unit.

(B) Test Sections

(1) General

Provide a test section which has a depth no greater than the layer depth shown in the plans or required by the *Standard Specifications*, whichever is less. Determine the length of the section by the width as shown in the *NCDOT Nuclear Gauge Operator's Manual.*

In situations where the chemical composition of the material affects the gauge moisture readings, the Materials and Tests Unit will provide specific instructions.

(2) Equipment

Equipment used in the compaction of test sections shall be approved before use. Where uniform density is not being obtained throughout the depth of the layer of material being tested, change the type and/or weight of the compaction equipment as necessary to achieve uniform density even though such equipment has been previously approved.

When aggregate base course material is involved, use at least one steel-wheel vibratory roller weighing at least 6 tons.

(3) Compaction

After the material in a test section has been spread and shaped to the required width and depth, begin the compaction of the section. Carry out compaction to obtain uniform maximum density over the entire test section.

Immediately before compacting the aggregate base course material, make sure it has satisfactory moisture content. If it is necessary to add water after the material is placed, scarify the material and add water uniformly throughout the full depth of the layer of the base course material.

(4) Testing Procedures

After the Contractor has completed compaction of the test section, the Engineer will conduct 5 density tests at random within 5 equal segments of the test section. Provide a smooth surface on the material being tested before any tests being performed. Density tests will not be made when the surface of an aggregate base course contains free moisture. The required density will be expressed as a percentage of the target density.

(5) Acceptance Requirements

Provide a density for aggregate base course of at least 98% of the nuclear target density. In addition, the nuclear density of any single test location shall be at least 95% of the nuclear target density.

The required density will be determined by the average of 5 nuclear density tests made at random locations within 5 equal segments of the test sections.

520-10 MAINTENANCE

Where the base material is placed in a trench section, provide adequate drainage through the shoulders to protect the subgrade and base until such time as the shoulders are completed.

Maintain the surface of the base by watering, machining, rolling or dragging when necessary to prevent damage to the base by weather or traffic.

Where the base or subgrade is damaged, repair the damaged area; reshape the base to required lines, grades and typical sections; and recompact the base to the required density at no cost to the Department.

520-11 MEASUREMENT AND PAYMENT

Aggregate Base Course will be measured and paid at the contract unit price per ton for the actual number of tons of aggregate which has been incorporated into the completed and accepted work. Sampling and acceptance will be determined in accordance with Section 1010.

The aggregate will be measured by being weighed in trucks on certified platform scales or other certified weighing devices. If permitted by the contract, the weight of base course material shipped by barge may be determined from water displacement measurements.

No deductions will be made for any moisture contained in the aggregate at the time of weighing.

Sand seal applied due to the failure of the Contractor to cover the base course as required will be incidental to the work of this section. If the Contractor fails to provide sand seal as required and the Engineer has the work performed by other forces, the cost of such work will be deducted from monies due or to become due to the Contractor.

Maintenance, repair and restoration of the base course and subgrade is incidental to the work of this section. If segregation during handling, hauling or placing occurs and the Engineer requires a change in methods or mixing on the road to correct this segregation, this work will be incidental to the work of this section. Removal and replacement of aggregate which is contaminated with foreign materials or outside the gradation limits will be incidental to the work of this section.

Payment will be made under:

Pay Item	**Pay Unit**
Aggregate Base Course	Ton